



FIG. 1

COMPOSITION (MASS %)											HEAT TREATMENT #1
		Cu	Zn	Al	Mn	Si	Bi	Pb	Se	B	
COMPARED PRODUCT	1	REMAINDER	20.0	-	2.5	1.0	-	6.5	-	-	-
	2	REMAINDER	30.0	3.0	3.0	1.0	-	-	-	-	-
	3	REMAINDER	35.0	-	2.5	1.0	-	-	-	-	-
	4	REMAINDER	35.0	-	2.5	1.0	2.0	-	-	-	-
	5	REMAINDER	42.0	-	2.5	1.0	2.0	-	-	-	-
INVENTION PRODUCT	1	REMAINDER	20.0	-	2.5	1.0	6.5	-	-	-	-
	2	REMAINDER	20.0	-	5.0	2.0	6.5	-	-	-	-
	3	REMAINDER	20.0	-	5.0	2.0	6.5	-	-	-	CARRIED OUT
	4	REMAINDER	20.0	-	5.0	2.0	6.5	-	0.1	-	CARRIED OUT
	5	REMAINDER	20.0	-	5.0	2.0	6.5	-	-	0.05	CARRIED OUT
	6	REMAINDER	20.0	-	5.0	2.0	4.2	-	-	-	-
	7	REMAINDER	20.0	-	5.0	2.0	10.0	-	-	-	-
MATRIX		COMPOUND		HARDNESS (Hv)		MAXIMUM SPECIFIC LOAD NOT CAUSING SEIZURE (MPa)		WEAR (mm)			
α - PHASE		Mn-S1		100		50 (OR MORE) #2		0.012			
α -PHASE+ β -PHASE		Mn-S1		200		20		0.003			
α -PHASE+ β -PHASE		Mn-S1		125		20		0.006			
α -PHASE+ β -PHASE		Mn-S1		125		35		0.005			
β -PHASE		Mn-S1		180		35		0.003			
α -PHASE		Mn-S1		100		50 (OR MORE)		0.010			
α -PHASE		Mn-S1		100		50 (OR MORE)		0.005			
α -PHASE		Mn-S1		150		50 (OR MORE)		0.003			
α -PHASE		Mn-S1		150		50 (OR MORE)		0.002			
α -PHASE		Mn-S1		150		50 (OR MORE)		0.002			
α -PHASE		Mn-S1		100		50 (OR MORE)		0.005			
α -PHASE		Mn-S1		100		50 (OR MORE)		0.006			

FIG. 2

WHERE #1 HEAT TREATMENT WAS CARRIED OUT AT 400 °C FOR 1 HOUR.
 #2 MAXIMUM SPECIFIC LOAD WAS 50 MPa IN THE EXPERIMENT.

ITEM	CONDITIONS OF SEIZURE RESISTANCE TEST	UNIT
SAMPLE DIMENSIONS	OD \times ID = ϕ 25 \times ϕ 21.7	mm
NUMBER OF REVOLUTION	820	rpm
SPEED	1.0	m/s
LUBRICANT	SAE#30	-
LUBRICATING METHOD	OIL BATH	-
LUBRICANT TEMPERATURE	ROOM TEMP	$^{\circ}$ C
COUNTERPART MATERIAL	S55C	-
COUNTERPART MATERIAL ROUGHNESS	NOT MORE THAN 0.3	Rz μ m
COUNTERPART MATERIAL HARDNESS	\geq 560	HV

FIG. 3

ITEM	CONDITIONS OF WEAR RESISTANCE TEST	UNIT
SAMPLE DIMENSIONS	OD \times ID = $\phi 29 \times \phi 21.7$	mm
NUMBER OF REVOLUTION	8.2	rpm
SPEED	0.01	m/s
SPECIFIC LOAD	10	MPa
TIME	8	HOURL
LUBRICANT	SAE#30	-
LUBRICATING METHOD	OIL BATH	-
LUBRICANT TEMPERATURE	150	$^{\circ}\text{C}$
COUNTERPART MATERIAL	S55C	-
COUNTERPART MATERIAL ROUGHNESS	1.0	Rz μm
COUNTERPART MATERIAL HARDNESS	≥ 560	HV

FIG. 4